

Integrated Resource Plan

TVA's Environmental & Energy Future

Draft | September 2010



Tennessee Valley Authority

Foreword

The Tennessee Valley Authority (TVA), a federal agency and the largest public power provider in the United States, has prepared this draft Integrated Resource Plan (IRP), titled *TVA's Environmental and Energy Future*, and is making it available to the public for review and comment. This IRP supports TVA's 2008 Environmental Policy as well as the 2007 Strategic Plan and the mission Congress established for TVA in the TVA Act.

As a federal agency, TVA is subject to the National Environmental Policy Act (NEPA) and is required to consider the potential environmental impacts of its proposed actions. In addition to this draft IRP, TVA has prepared a draft environmental impact statement (EIS).

This IRP establishes a strategic direction and provides TVA with the flexibility to make future decisions in a changing regulatory and economic environment. A broad spectrum of options is evaluated for meeting the TVA system demand over the next 20 years in an efficient, reliable, and environmentally sound manner. The draft IRP considers future power needs and economic conditions as well as other uncertainties, such as future environmental legislation and future commodity prices that will affect the choices TVA makes in meeting the demand on its system.

This IRP is an important evaluation for TVA, its customers and residents living within the Valley region. The IRP reflects TVA's objectives of providing competitive rates to its customers, delivering reliable power and a commitment to environmental stewardship within the Tennessee Valley region. The IRP and EIS not only evaluate the means by which TVA will supply reliable power over the next 20-year period, they also evaluate the impacts of TVA's actions on the economy and environment of the Tennessee Valley region.

The NEPA process provides a structured means of obtaining public input into decision-making. A 45-day public comment period will begin with the publication of the Notice of Availability in the Federal Register of the draft IRP and EIS. During this time, TVA will hold public meetings and solicit public comment. All substantive comments on the IRP and EIS will be addressed.

The breadth of analysis that will be presented in the draft IRP is much broader than will be presented in the final IRP. Following review of public comments, data will be refreshed and additional analyses will be completed. This will allow TVA to present the most up-to-date and accurate information on future power needs and resource options in the final IRP and EIS, which are scheduled for release in spring 2011. In addition, building on the demonstrated value of this IRP's approach, it is anticipated that TVA will begin the next IRP effort by 2015.

Table of Contents

Executive Summary	6
Overview	6
Public Participation	7
Need for Power	8
Approach	11
Key Themes from Results	13
Highest Ranked Planning Strategies (Draft)	15
1 Introduction to TVA's Environmental and Energy Future	17
1.1 Brief Description of TVA	19
1.2 TVA Region and Power System	20
1.3 Purpose and Need for Integrated Resource Planning	21
1.3.1 The Challenge	21
1.3.2 The Role of the Integrated Resource Plan	23
1.3.3 Impact of The National Energy Policy Act of 1992	24
1.4 TVA's IRP Goals	24
1.5 TVA's IRP Objectives	25
1.6 The IRP Process	26
1.6.1 Develop Scope	27
1.6.2 Develop Inputs and Framework	27
1.6.3 Analyze and Evaluate	29
1.6.4 Release of Draft IRP and Solicitation of Public Comment	29
1.6.5 Incorporate Public Comment and Additional Modeling	30
1.6.6 Identify and Recommend Preferred Strategy	30
1.7 IRP Deliverables	31
1.7.1 Draft and Final IRP Documents	31
1.7.2 Draft and Final Environmental Impact Statement	31
2 Public Participation	32
2.1 Scoping Period	33
2.1.1 Public Meetings	33
2.1.2 Written Comments	34
2.1.3 Results of the Scoping Process	35
2.2 Analysis and Evaluation Period	37
2.2.1 Stakeholders' Review Group	37
2.2.2 Quarterly Public Briefings	40
2.2.3 Phone Survey	40
2.2.4 Overview of Comments Received During the Analysis and Evaluation Period	41
2.2.5 Stakeholder Concerns	41

Integrated Resource Plan

2.3 Draft IRP Public Comment Period	42
2.3.1 Public Meetings	43
2.3.2 Webinars	43
2.3.3 Written Comments	43
2.3.4 Overview of Comments Received During Draft IRP Public Comment Period	43
3 Need for Power Analysis	44
3.1 Power Demand	44
3.1.1 Methodology	44
3.1.2 Forecast Accuracy	48
3.1.3 Forecasts of Peak Load and Net System Requirements	50
3.2 Power Supply	52
3.2.1 Base Load Resources	53
3.2.2 Intermediate Resources	54
3.2.3 Peaking Resources	54
3.2.4 Storage Resources	54
3.2.5 Capacity and Energy	55
3.2.6 TVA's Generation Mix	55
3.3 Assessment of Need for Power	58
4 Energy Resource Options	61
4.1 Introduction	61
4.2 Options Identified but Not Further Evaluated	62
4.3 Options Included in IRP Evaluation	63
4.3.1 Fossil-Fueled Generation	63
4.3.2 Nuclear Generation	67
4.3.3 Renewable Generation	68
4.3.4 Energy Storage	74
4.3.5 Energy Efficiency and Demand Response	75
5 Resource Plan Development and Analysis	83
5.1 Overview of Scenario Planning	83
5.2 Key Uncertainties that Define the Scenarios	85
5.3 Planning Strategies	88
5.4 Portfolio Development	90
5.5 The Planning Strategy Scorecard	91
5.5.1 Ranking Metrics	92
5.5.2 Strategic Metrics	94
5.5.3 Technology Innovations Narrative	97
5.6 Scorecard Calculation and Color Coding	97
5.7 Planning Strategy Evaluation	100

6 Resource Plan Results	104
6.1 Firm Requirements and Capacity Shortfall	104
6.2 Expansion Plans	106
6.3 System Energy Mix	113
6.4 Plan Cost and Risk	114
7 Recommended Strategies	117
7.1 Overview of the Selection Process	117
7.2 Scorecard Results	118
7.3 Initial Ranking of Strategies	122
7.3.1 Sensitivity Cases	123
7.4 Other Strategic Considerations	125
7.5 Recommended Strategies	128
7.6 Implementing Portfolio	129
7.7 Conclusion and Next Steps	131
Appendix A – Method for Computed Environmental Impact Metrics	132
Air Impact Metric and Ranking	132
Water Impact Metric and Ranking	135
Waste Calculations	136
Appendix B – Method for Computed Economic Impact Metrics	139
Regional Socioeconomic Impacts	139
Process	139
Methodology	141
Findings	142
Appendix C – Expansion Plan Listing	143
Planning Strategy A – Limited Change in Current Portfolio	143
Planning Strategy B – Baseline Plan Resource Portfolio	144
Planning Strategy C – Diversity Focused Resource Portfolio	145
Planning Strategy D – Nuclear Focused Resource Portfolio	146
Planning Strategy E – EEDR and Renewables Focused Portfolio	147